Formulario

$z = x + yi \qquad r = |z| = \sqrt{x^2+y^2}$

$Re(z) = \frac{z+\bar{z}}{2}$ X $\qquad Im(z) = \frac{z-\bar{z}}{2i}$ Y $\qquad \theta = \arctan\left(\frac{y}{x}\right)$

$x = r\cos\theta$

$y = r\,sen\theta$

$(\cos\theta + i\,sen\theta)^n = \cos(n\theta) + i\,sen(n\theta)$

$r\cos\theta + i\,r\,sen\theta$

$f(z) = u(x,y) + iv(x,y)$

$z = r(\cos\theta + i\,sen\theta)$

$e^z = e^x(\cos y + i\,sen\,y)$

$z = z_1 z_2 \rightarrow \theta = \theta_1 + \theta_2$

$|e^z| = e^{Re(z)}$

$z = \frac{z_1}{z_2} \rightarrow \theta = \theta_1 - \theta_2$

$z = e^{i\theta}$

$e^z = 1$, if $z = 2\pi n i \quad n \in \mathbb{Z}$

$\overline{e^z} = e^{\bar{z}}$

$senh(z) = \frac{e^z - e^{-z}}{2}$

$cosh(z) = \frac{e^z + e^{-z}}{2}$

$sen\,z = \frac{e^{iz} - e^{-iz}}{2i} \quad | \quad \cos z = e^{iz} + e^{-iz}$

$sen(-z) = -sen(z) \quad | \quad \cos(-z) = \cos(z)$ / Egcol Hiper

$sen(iz) = i\,sen(z)$

$sen(z \pm w) = sen(z)\cos(w) \pm \cos(z)\,sen(w)$

$\cos(iz) = i\cos(z)$

$\cos(z \pm w) = \cos(z)\cos w \mp sen(z)\,sen(w)$

$\ln(z) = \ln|z| + i\,Arg(z)$ $\qquad$ Rama Prin $= 0$

$\ln(z) = \ln|z| + i\,[Arg(z) + 2\pi n]$

$w = \pm\left[\sqrt{\frac{1}{2}\left(a + \sqrt{a^2+b^2}\right)}\right] + i\,signo(b)\sqrt{\frac{1}{2}\left(-a \pm \sqrt{a^2+b^2}\right)}\,]$

$sen^{-1}(z) = -i\ln\left[iz + (1-z^2)^{1/2}\right]$

$z^w = e^{w\ln z}$

$\cos^{-1}(z) = -i\ln\left[z + (1-z^2)^{\frac{1}{2}}\right]$

$z^{w_1} z^{w_2} = z^{w_1+w_2}$

$\frac{z^{w_1}}{z^{w_2}} = z^{w_1-w_2}$

- $z^w = e^{w\ln z + 2\pi n w i}$
- $e^{2\pi n w i} = 1$

$Pr[z^w] = e^{w\ln z} = e^{w[\ln|z| + i\,Arg(z)]}$

- $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$
- $\frac{\partial v}{\partial x} = -\frac{\partial u}{\partial y}$

$\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta} \qquad \frac{\partial v}{\partial r} = -\frac{1}{r}\frac{\partial u}{\partial \theta}$

// Armónica

$\frac{\partial^2 \phi}{\partial x^2} + \frac{\partial^2 \phi}{\partial y^2} = 0$

$\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$

$\int_a^b f(t)\,dt = \int_a^b u(t)\,dt + i\int_a^b v(t)\,dt$

$z(t) = x(t) + i\,y(t)$

$a \leq t \leq b$

$c = \sqrt{a^2 \cdot b^2}$

$$\int_C F(z)\,dz = \int_a^b F[z(t)]\;z'(t)\,dt$$

$$\oint_C f(z)\,dz = 0 \;\vdots\; \oint z^n\,dz = 0 \;\vdots\; \oint e^z\,dz = 0$$

- Cerrada
- Analítica

$$\oint_C (z-z_0)^n\,dz = \begin{cases} 0 & \text{if } n \neq -1 \\ 2\pi i & \text{if } n = -1 \end{cases}$$

1 formula

$$\oint_c \frac{f(z)}{z-z_0}\,dz = 2\pi i\,f(z_0)$$

2 formula

$$\oint_c \frac{f(z)\,dz}{(z-z_0)^{n+1}} = \frac{2\pi i}{n!}\,f^{(n)}(z_0)$$